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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/528,184	05/31/2005	Frank K. Crundwell	04634/0202648-US0	6757
7278	7590	01/17/2008	EXAMINER	
DARBY & DARBY P.C. P.O. BOX 770 Church Street Station New York, NY 10008-0770			MCGUTHRY BANKS, TIMA MICHELE	
			ART UNIT	PAPER NUMBER
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/528,184	Applicant(s) CRUNDWELL ET AL.	
	Examiner Tima M. McGuthry-Banks	Art Unit 1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-56 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-4 and 9-56 is/are rejected.
- 7) ☒ Claim(s) 5-8 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 7/24/06 & 5/31/06 3/17/05
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: ____.

DETAILED ACTION

Status of Claims

Claims 1-8, 10-12, 14-16, 18-20, 22-24, 27, 29, 34, 35, 38-42, 44, 46-49, and 51 are as originally filed. Claims 9, 13, 17, 21, 25, 26, 28, 30-33, 36, 37, 43, 45, 50, and 52-56 are currently amended.

Information Disclosure Statement

The information disclosure statement filed 24 July 2006 fails to comply with 37 CFR 1.98(a)(2), which requires a legible copy of each cited foreign patent document; each non-patent literature publication or that portion which caused it to be listed; and all other information or that portion which caused it to be listed. It has been placed in the application file, but the information referred to therein has not been considered. There is no copy of item CB.

The information disclosure statement filed 24 July 2006 fails to comply with the provisions of 37 CFR 1.97, 1.98 and MPEP § 609 because items CE and CH do not have page numbers. It has been placed in the application file, but the information referred to therein has not been considered as to the merits. Applicant is advised that the date of any re-submission of any item of information contained in this information disclosure statement or the submission of any missing element(s) will be the date of submission for purposes of determining compliance with the requirements based on the time of filing the statement, including all certification requirements for statements under 37 CFR 1.97(e). See MPEP § 609.05(a).

Claim Objections

Claim 22 is objected to because of the following informalities: in line 2, "ro" should be "to."

Claim 30 is objected to because of the following informalities: at the end of line 2, one of the periods should be deleted. Appropriate correction is required.

Claim 32 is objected to because of the following informalities: in line 2, "configuration" should be "configuration" and in line 3, "sulphode" should be "sulphide." Appropriate correction is required.

Claim 53 is objected to because of the following informalities: inline 2 "sutiable" should be "suitable." Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-4, 9, 21, 25, 28-32, 45-47, 49-51, and 54-56 are rejected under 35 U.S.C. 102(b) as being anticipated by Kohr et al (US 6,110,253).

Kohr et al anticipates the claimed invention. Kohr et al teaches a high temperature heap bioleaching process. The flow rate at which the heap is irrigated with the process leach solution will depend on factors including temperature (column 15, lines 29-42). Regarding Claims 2-4,

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air flow within the heap is ensured (column 9, lines 7 and 8). The movement of air up through the heap transports heat up through the ore (column 11, lines 2 and 3). Hot air may be added to the heap (line 46). Regarding Claim 9, hot air supply supplies ambient air for increasing oxygen levels in the heap (lines 62-66). Regarding Claim 21, the heap contains one or more temperature monitoring devices throughout the heap (lines 10-13). Regarding Claim 25, the pregnant processes leach solution needs to be at the correct temperature for solvent extraction (column 16, lines 50-60). Regarding Claim 28, it is inherent that a support surface is used, since a support material is used (column 10, lines 8 and 9). The system has a hot air supply line buried in the bottom of the heap (column 11, lines 62-64) and a drain (column 16, line 30). Irrigation occurs through reservoirs (column 16, lines 32 and 33). The support material is coated with sulfide minerals (column 8, lines 11 and 12). Hot air through steam heats the heap from the bottom (column 11, lines 62 and 63). The heap should be heated to a temperature to maximize copper recovery (lines 16-25) using hot air (line 46). Regarding the step of reducing, it is inherent that the shot air through steam would be reduced, since the heap is being heated to a predetermined temperature. The heap is irrigated with a process leach solution (column 14, lines 66 and 67). Regarding Claim 29, the heap is inoculated with a culture including at least one microorganism (column 12, lines 1 and 2) and sulfuric acid (column 15, line 1). Regarding Claim 30, the support material can be rock (column 10, line 3). Regarding Claim 31, the hot solution is steam. Regarding Claim 32, US 5,766,930, incorporated by reference in column 7, line 67, teaches that the sulfide mineral concentrate contain as much metal sulfides a practicable (US '930, column 16, lines 53-55). Kohr et al further teaches that the process leach solution is applied from a rate of at least 72 l/m²/day (column 16, lines 15-17). The preferred heap design is over 3 meters high

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to maximize heat retention (column 13, lines 39-41). Regarding Claim 45, since thermophilic microorganisms derived their energy from inorganic elements, iron, sulfur and carbon dioxide act as nutrients (column 12, lines 50-57). Regarding Claims 46 and 47, the rock can contain carbonate (column 10, lines 22 and 23). Regarding Claim 49, steam is added (column 11, line 62). Regarding Claim 50, a heap contains a fuel component (column 7, line 31). Regarding Claim 51, the fuel component includes pyrite (line 29). Regarding Claim 54, the irrigation does not have to be continuous (column 16, lines 21 and 22). Regarding Claim 55, the heap may be heated by air to a predetermined temperature; it is inherent that this heating would be intermittent to maintain the optimal temperature (column 11, lines 42-47). Regarding Claim 56, a second or third heap may be added; the subsequent heaps are added when the previous heap is at a predetermined temperature (column 17, lines 35-42). It is inherent that the heaps are controlled independently, since the temperature is controlled.

Claims 1, 2, and 13-15 are rejected under 35 U.S.C. 102(e) as being anticipated by Harlamovs et al (US 6,736,877 B2).

Harlamovs et al anticipates the claimed invention. Harlamovs et al teaches a method of extracting zinc from a sulfidic ore that comprises bioleaching in a heap. The aeration rate has an effect on zinc extraction rate (column 13, lines 10 and 11), which in turn has an effect on the irrigation solution, since part of the pregnant leach solution is recycled (column 8, lines 62 and 63). Regarding Claim 2, forced aeration is not employed (column 8, line 16). Regarding Claims 13-15 and 17-19, the range of the ratio of aeration rate ($5 \text{ L/m}^2 \text{ min}$) to irrigation rate (Table 1) is from 0.417:1 to 5:1.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 16 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harlamovs et al as applied to Claims 1, 13-15, and 17-19 above.

Harlamovs et al discloses the invention substantially as claimed. However, Harlamovs et al does not disclose the claimed ratios. Harlamovs et al teaches providing air at a rate of at least

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5 L/m² min and irrigating with a solution at a rate of at least 0.15 L/m² min (column 3, lines 41-44). In the case where the claimed ranges overlap or lie inside ranges disclosed by the prior art, a *prima facie* case of obviousness exists. See MPEP § 2144.05.

Claims 10-12 and 22-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kohr et al as applied to Claims 1, 9 and 22 above.

Kohr et al discloses the invention substantially as claimed. However, Kohr et al does not specifically disclose the oxygen utilization in the ranges in Claim 10-12 or the point at which the temperature is determined as in Claims 22-24.

Regarding Claims 10-12, Kohr et al teaches increasing oxygen levels in the heap (column 11, lines 62-66). A particular parameter, i.e. maintaining oxygen utilization, must first be recognized as a result-effective variable, i.e., a variable which achieves a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation; therefore a *prima facie* case of obviousness exists. See MPEP § 2144.05 II B.

Regarding Claims 22-24, Kohr et al teaches thermocouples throughout the heap (column 11, lines 13 and 14). A particular parameter, i.e. where the temperature is determined, must first be recognized as a result-effective variable, i.e., a variable which achieves a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation; therefore a *prima facie* case of obviousness exists. See MPEP § 2144.05 II B.

Claims 26 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kohr et al as applied to claim 1 above, and further in view of Norton et al (US 6,860,919).

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Kohr et al discloses the invention substantially as claimed. However, Kohr et al does not disclose determining the oxidation rate as claimed. Norton et al teaches recovering precious metals from sulfide minerals by bioleaching. Bioleaching at an elevated temperature results in a high rate of sulfide mineral oxidation, but is dependent on the supply of oxygen and carbon dioxide to maintain high rates of oxidation and microorganism growth at adequate rates (column 5, line 64 to column 6, line 4). It would have been obvious to one of ordinary skill in the art at the time the invention was made to determine the oxidation rate on the supply of the oxygen and carbon dioxide content, since controlling the content of inlet gas increases the oxidation rate and maximizes the utilization of oxygen (column 11, line 66 to column 12, line 6).

Regarding Claim 27, metal such as copper is recovered (Kohr et al, column 16, line 50).

Claims 33-40, 42, 43, 44, 52 and 53 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kohr et al as applied to claim 1 above, and further in view of MacLeod et al (Applied Environmental Microbiology).

Kohr et al discloses the invention substantially as claimed. However, Kohr et al does not disclose introducing the microorganisms into the heap as in Claims 33-44.

Regarding Claims 33-35, 42 and 43 MacLeod teaches the ability of starved bacteria (ultramicrobacteria or UMB) to penetrate further into cores than the normal size vegetative cells (abstract). Regarding Claim 35, the cells were starved by limiting the amount of carbon available (pages 1365-66) resulting the loss of exopolymers (glycocalyx) (page 1370, column 1). The reference teaches that when using traditional vegetative bacteria, the greatest numbers are attached near the inlet of a matrix, and this adhesion is irreversible (page 1370, column 2). The reference teaches that the thick aggregation of bacteria and glycocalyx at the inlet area may have

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physically prevented the substrate from reaching all of the cells, or it may have reduced dissolved oxygen levels. Consequentially, a slower measure of cell respiration would have been obtained (page 1371, column 2). Regarding Claim 34, cells starved for nutrients for two weeks prior to injection were observed to be distributed uniformly throughout the matrix, thus allowing the deeper penetration of a greater number of bacterial cells (page 1370, column 2 to page 1371, column 1). Regarding Claim 47, nutrient stimulation following cell distribution allows the cells to lose their metabolic dormancy and produce reductions in core permeability due to cell growth and polymer production (abstract), and thus reactivating production of exopolymers. Regarding Claim 43, air includes carbon dioxide.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use UMB in the method of Kohr et al, since MacLeod teaches that use of these cells allows for deeper penetration of a greater number of bacterial cells (page 1370, column 2 to page 1371, column 1).

Regarding Claim 36, microorganisms are added to the heap (Kohr et al, column 12, line 2). Regarding Claim 37, the process leach solution also contains nutrients (column 15, line 2). Regarding Claim 38, the heap is inoculated with a mixed culture. Since thermophilic microorganisms derived their energy from inorganic elements, iron, sulfur and carbon dioxide act as nutrients (column 12, lines 50-57). Regarding Claims 39 and 40, the rock can contain carbonate (column 10, lines 22 and 23). Regarding Claim 42, the gas includes steam (column 11, line 62). Regarding Claim 52, a heap contains a fuel component (column 7, line 31). Regarding Claim 53, the fuel component includes pyrite (line 29).

Claim 41 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kohr et al in view of MacLeod et al as applied to claims 1, 33, 37 and 38 above, and further in view of Harrington (US 6,435,769 B2).

Kohr et al in view of MacLeod et al discloses the invention substantially as claimed. However, Kohr et al in view of MacLeod et al does not disclose slow release nutrients as claimed.

Harrington teaches a process for treating earth materials such as rock heaps. Microbiological nutrients may be added before, after or during a rock heap is formed, and a slow release component is suitable as well (column 6, lines 16-50). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a slow release nutrient in the process of Kohr et al in view of MacLeod et al, since Harrington teaches that nutrients are known in the art for promoting microbial activity (column 16, lines 42-63).

Claim 48 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kohr et al as applied to claims 1 and 45 above, and further in view of Harrington.

Kohr et al discloses the invention substantially as claimed. However, Kohr et al does not disclose slow release nutrients as claimed.

Harrington teaches a process for treating earth materials such as rock heaps. Microbiological nutrients may be added before, after or during a rock heap is formed, and a slow release component is suitable as well (column 6, lines 16-50). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a slow release nutrient in the process of Kohr et al, since Harrington teaches that nutrients are known in the art for promoting microbial activity (column 16, lines 42-63).

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 1 and 33-49 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-19 of copending Application No. 10/528,381 in view of Kohr et al. Application '381 does not claim a method of controlling a heap leach process as claimed. Kohr et al teaches a high temperature heap bioleaching process. The flow rate at which the heap is irrigated with the process leach solution will depend on factors including temperature (column 15, lines 29-42). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the temperature controlling process with the claimed method of Application '381, since Kohr et al teaches that the rate of biooxidation of ore will tend to be greatest for a period shortly after the heap is raised to the optimum

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temperature (column 15, lines 48-50). Claims 33-49 of the present invention are substantially taught in Claims 1-19 of Application '381 as shown below in the table.

Present Invention Claims	Application 10/528,381 Claims
33	1
34	2
35	3
36	4
37	5
38	6
39	7
40	8
41	9
42	10
43	17
44	18
45	12
46	13
47	14
48	15
49	16

This is a provisional obviousness-type double patenting rejection.

Allowable Subject Matter

Claims 5-8 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: the prior art of record does not disclose or suggest determining the advection at or below a heap surface as in Claim 5.

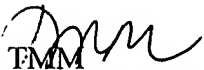
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Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tima M. McGuthry-Banks whose telephone number is (571) 272-2744. The examiner can normally be reached on M-F 7:00 am - 3:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King can be reached on (571) 272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.


TMM

7 January 2008


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